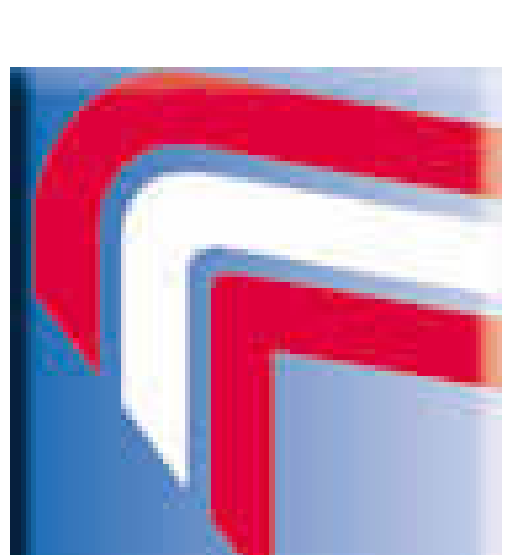


# Selective Ligation Methods for the Ordered Attachment of Proteins to Surfaces

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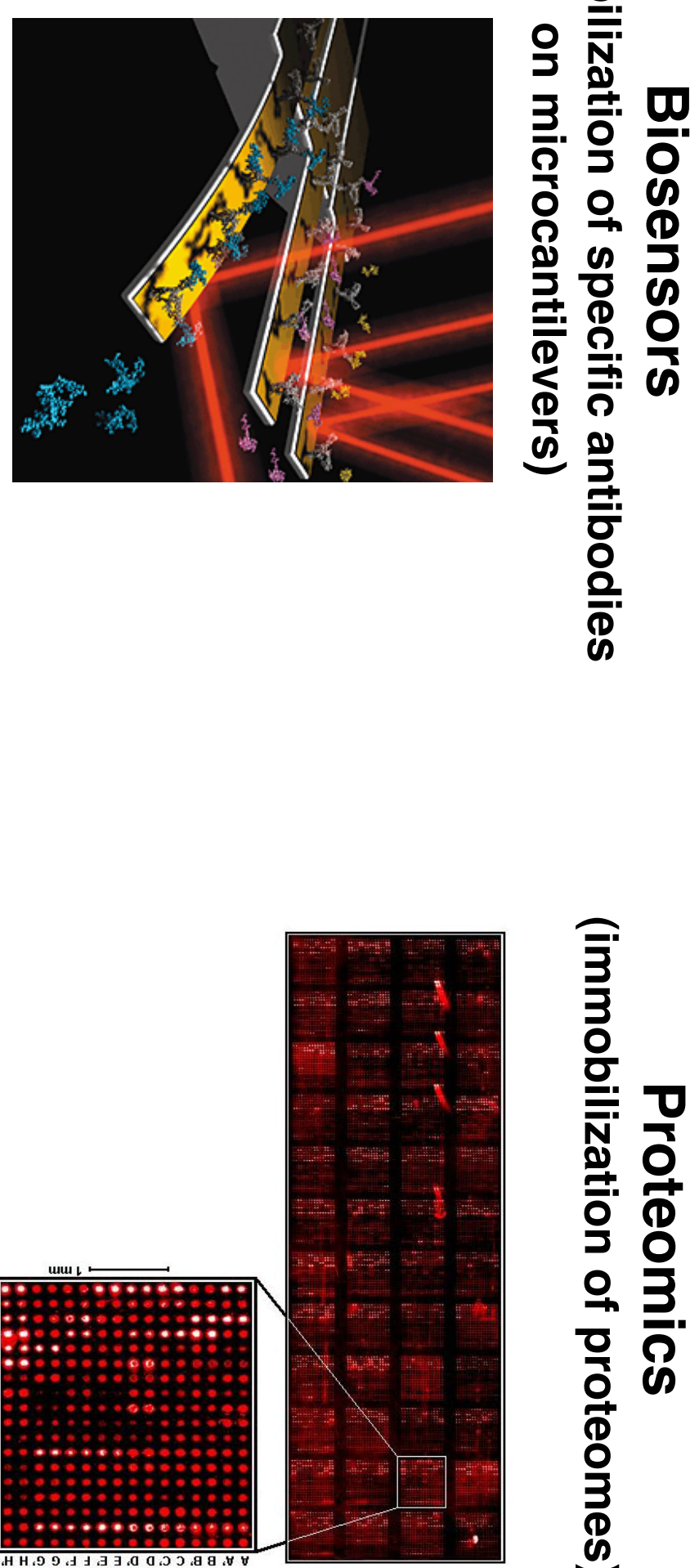
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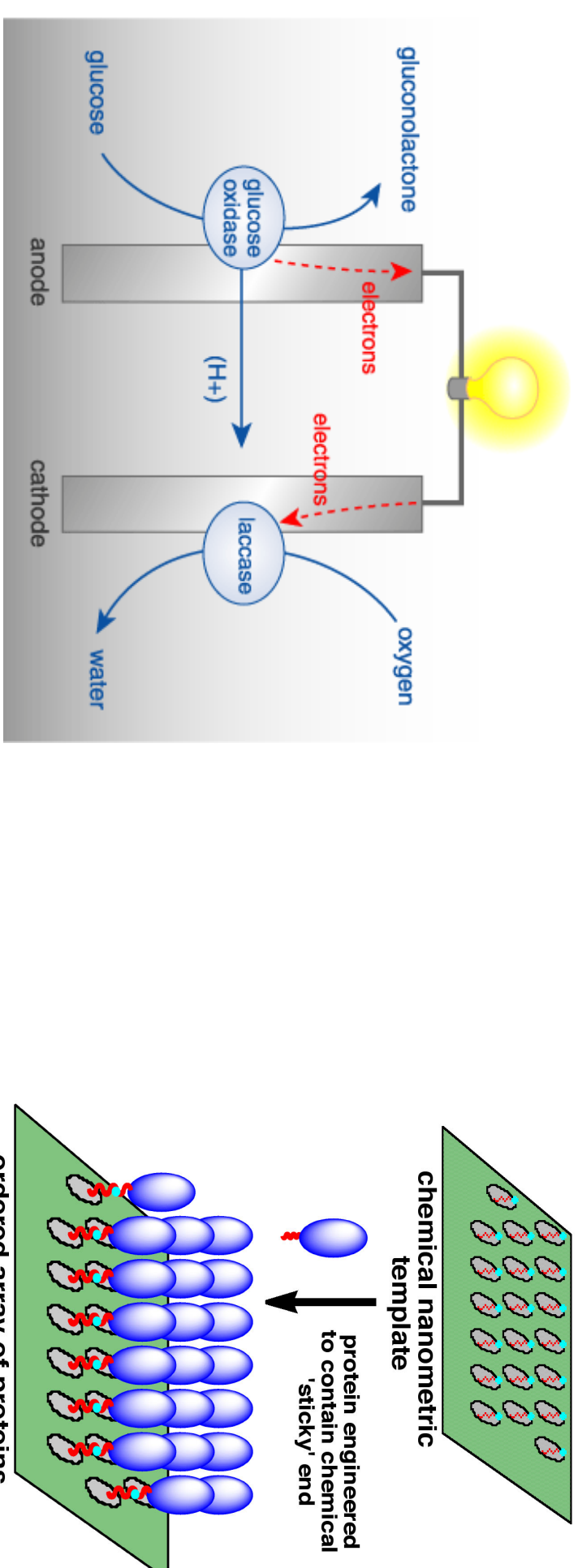


## Motivation and Objectives

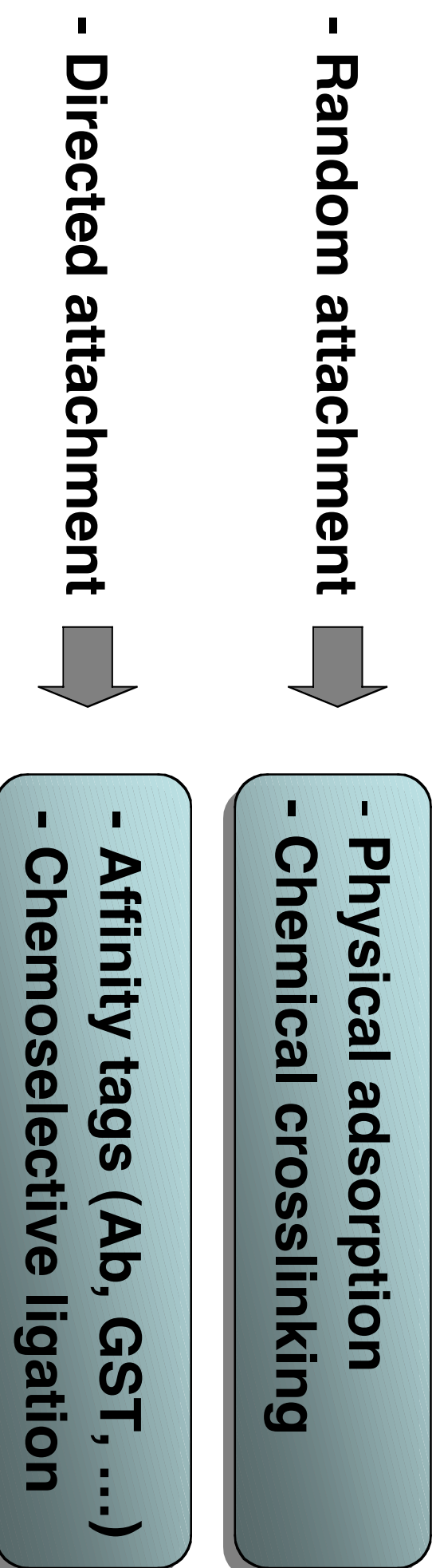
The attachment of proteins to surfaces provides a very powerful tool:



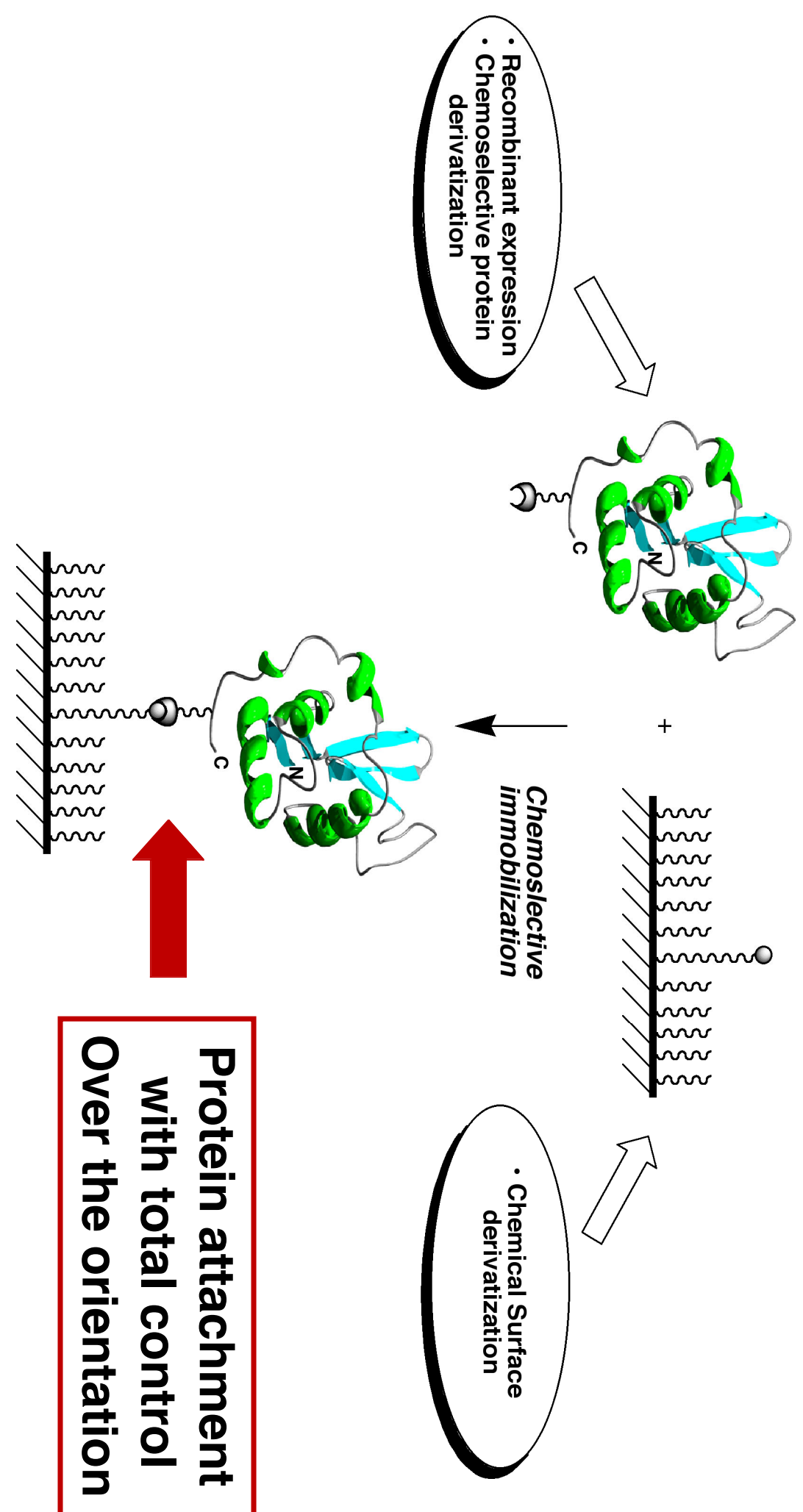
Biofuel Cells (immobilization of RedOx Enzymes)



Different ways of attachment:



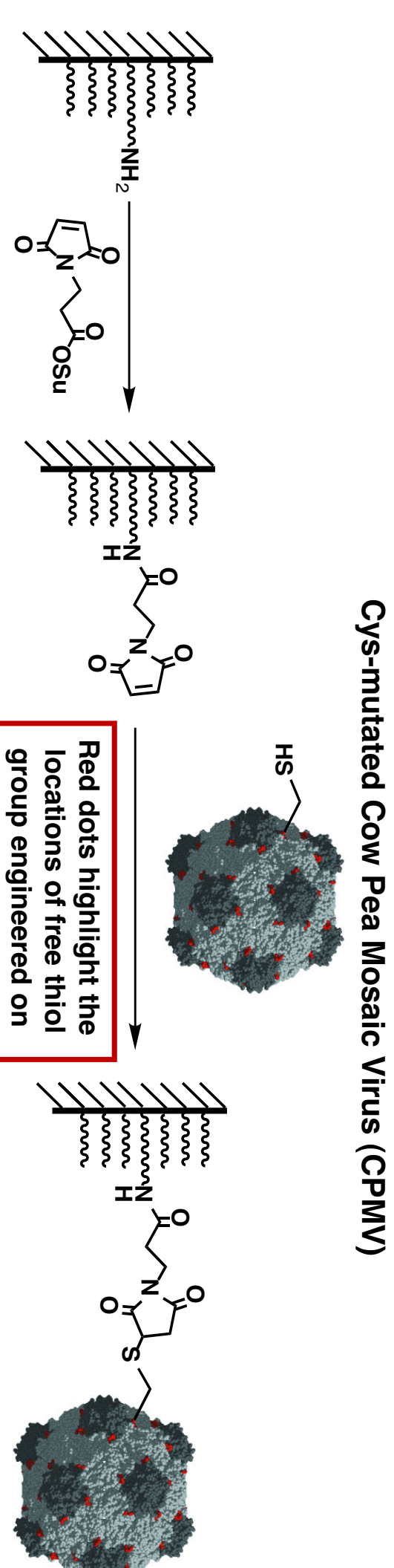
The purpose of this work is to use the concept of chemoselective immobilization to control the attachment of biomolecules to surfaces.



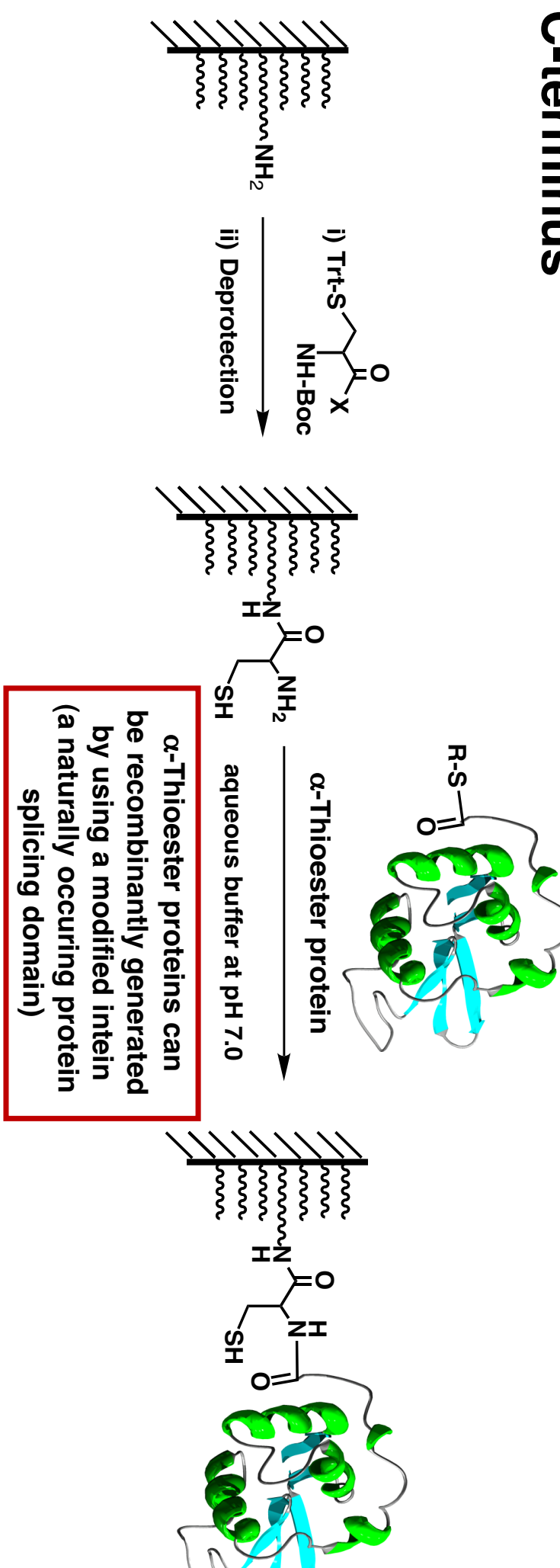
## Rationale and Experimental

Two generic chemoselective approaches have been used in the present work:

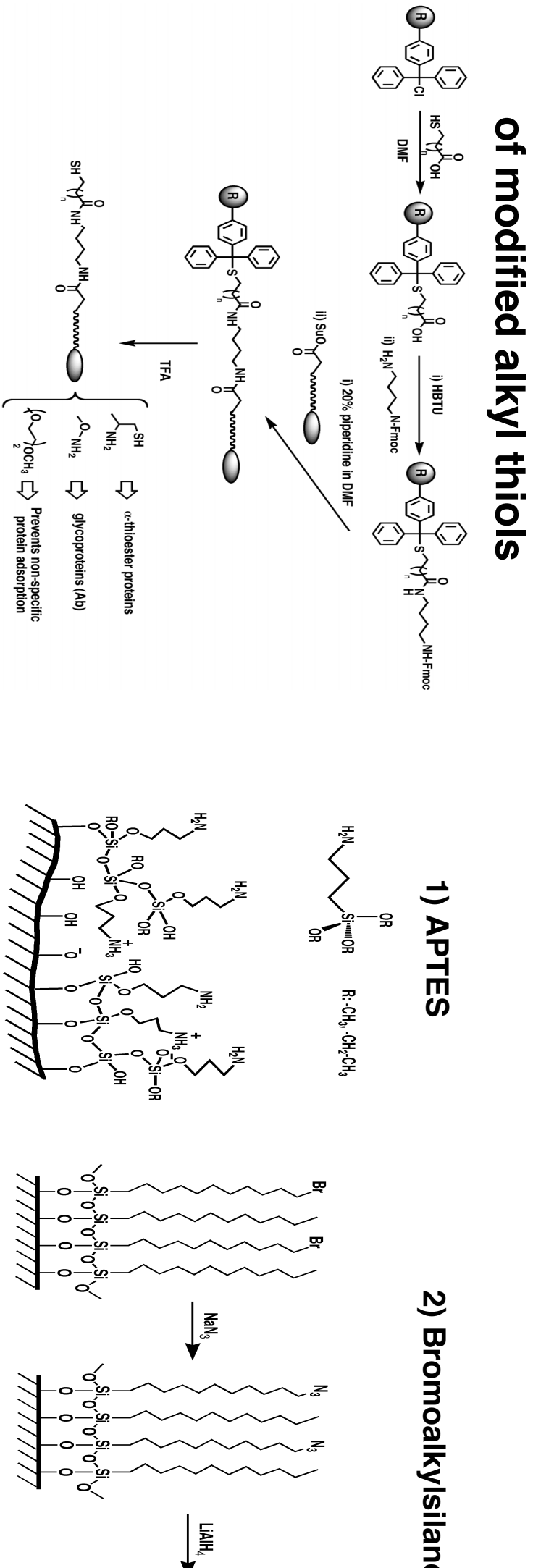
1) Creation of virus nano-templates



2) General method for the selective attachment of proteins through its C-terminus



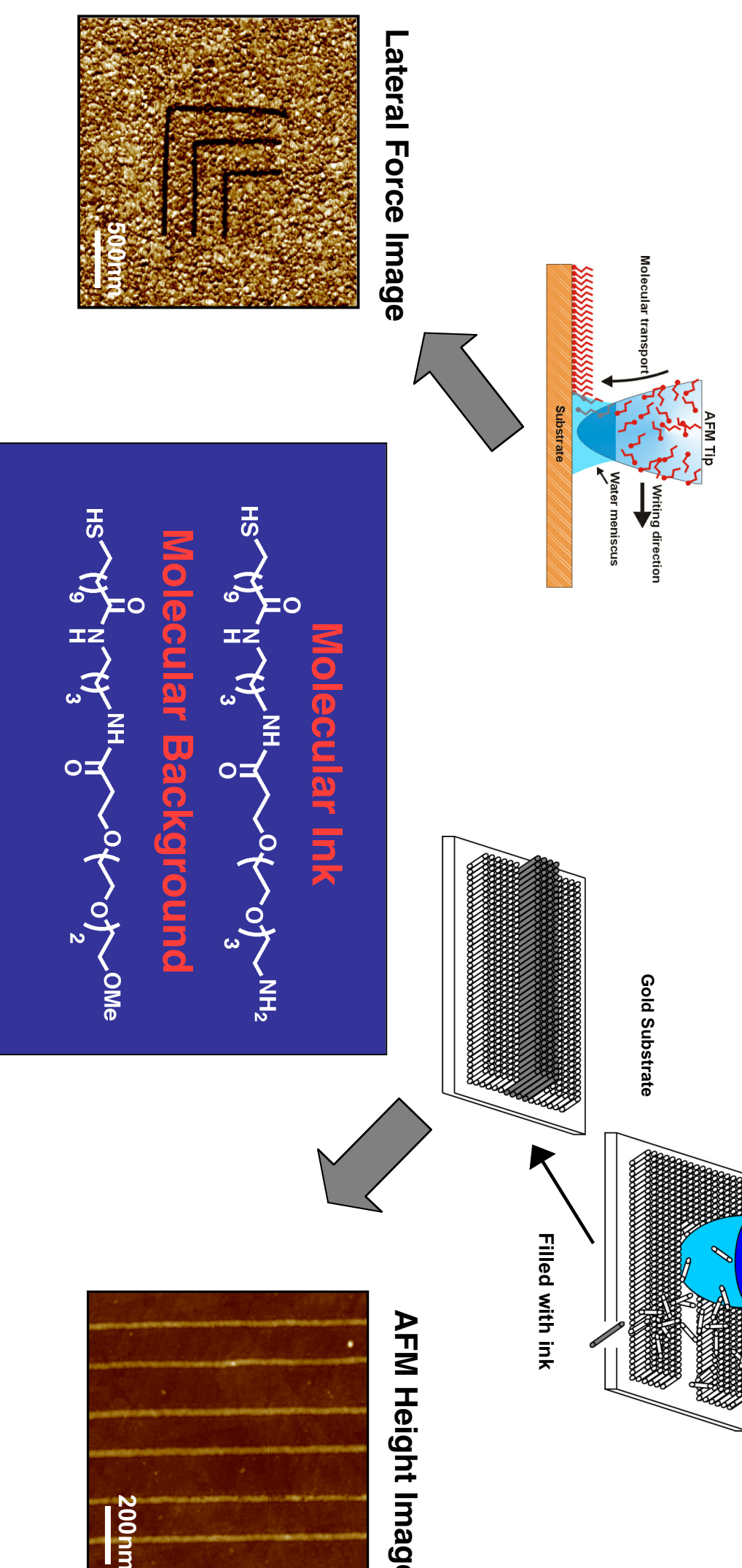
Development of novel approaches for chemical modification of Si- and Au-based surfaces:



Chemical nanotemplates are created by using different Scanning Probe Nanolithography (SPN) techniques:

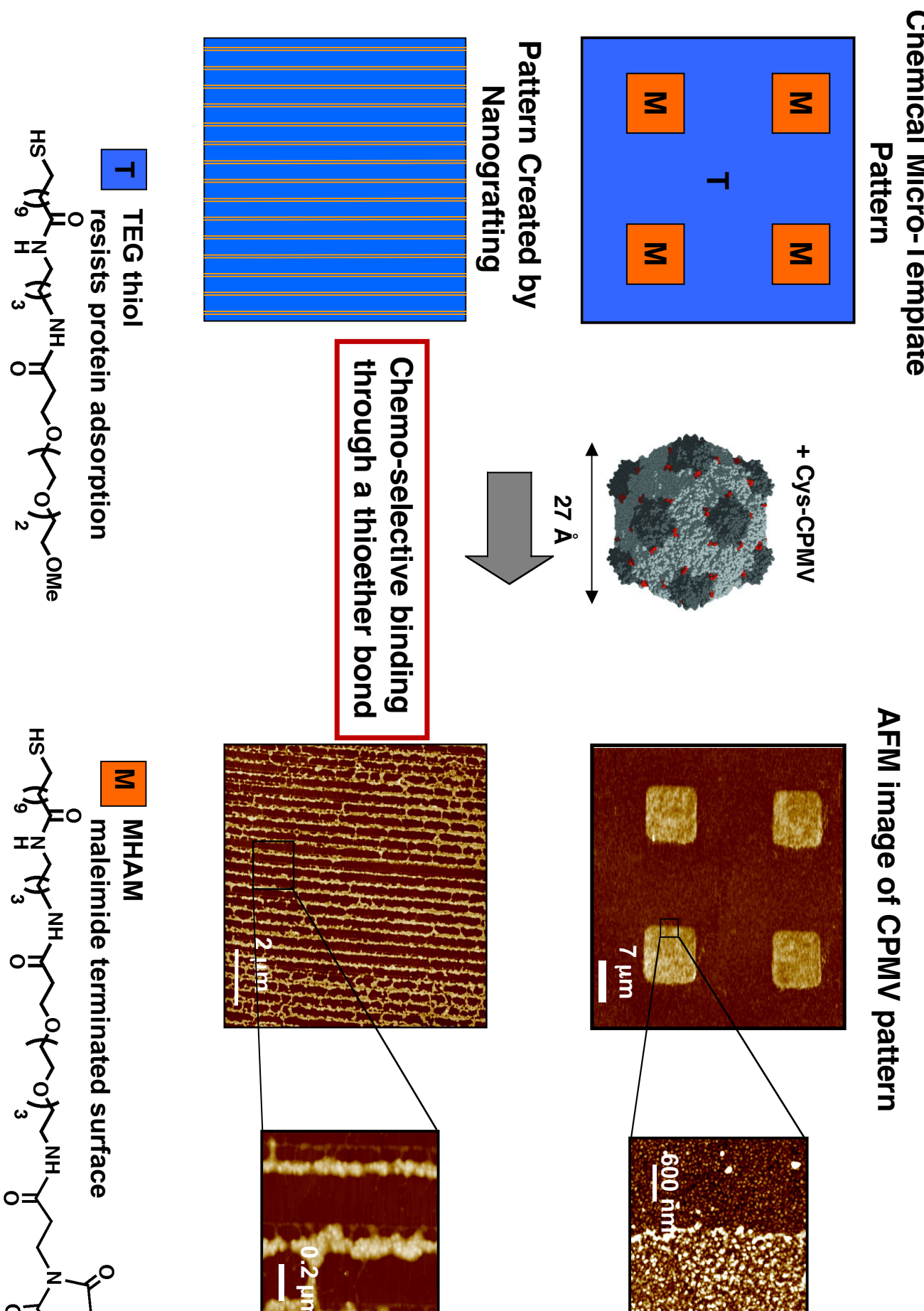
Dip-Pen Nanolithography

2-Step Nanografting

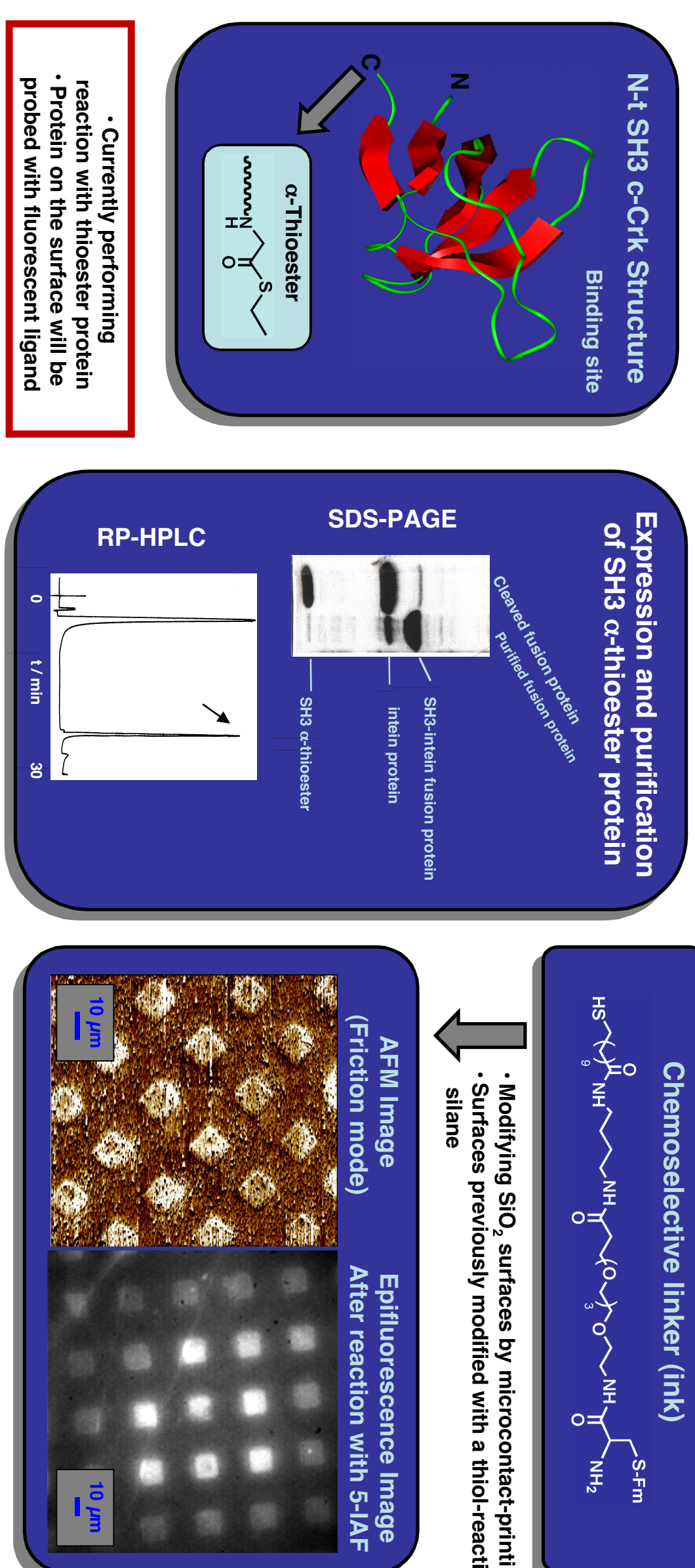


## Results

We have bound Cys-CPMV on micrometric and nanometric chemical templates:

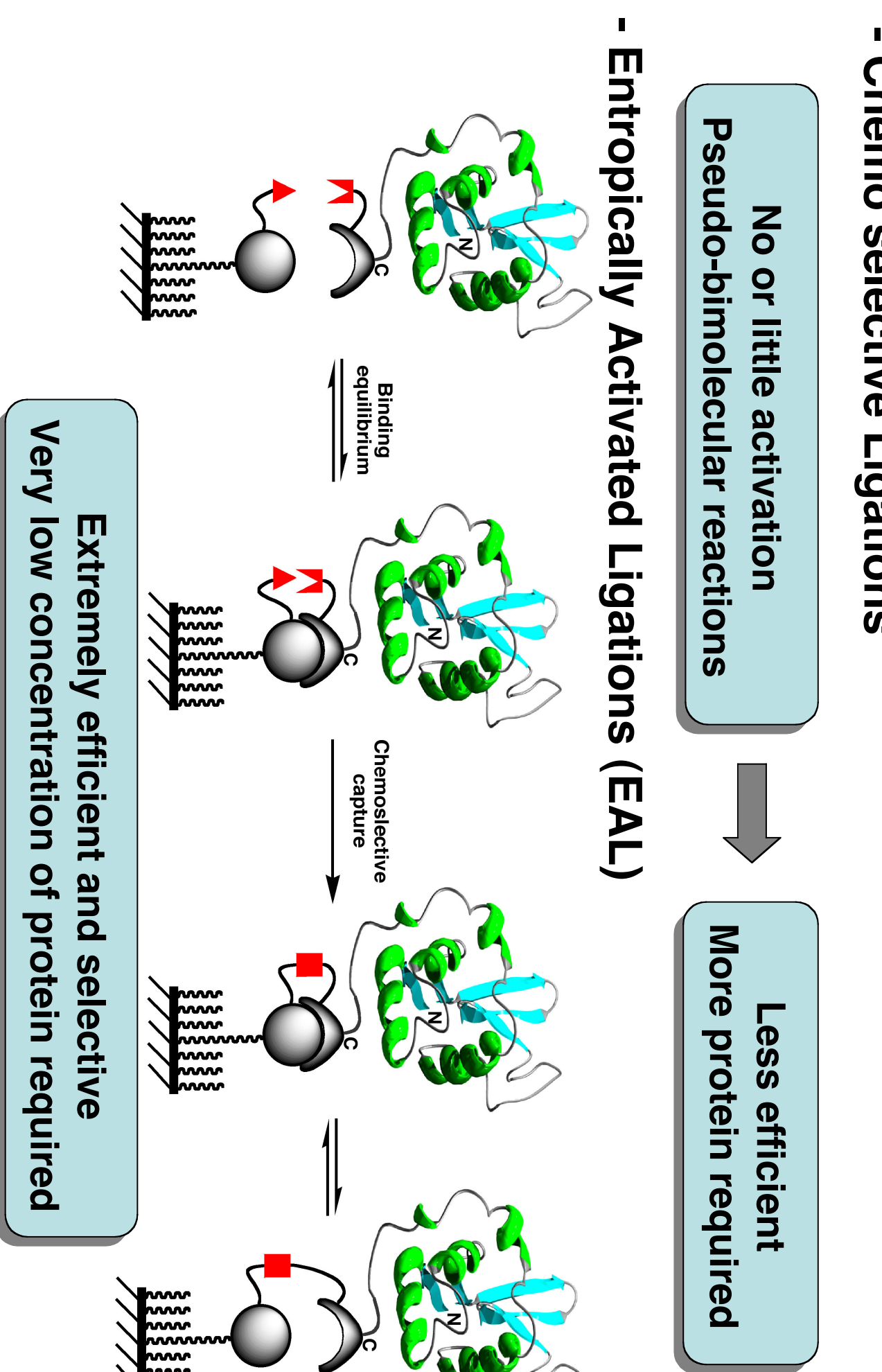


We are templating deposition of globular proteins:

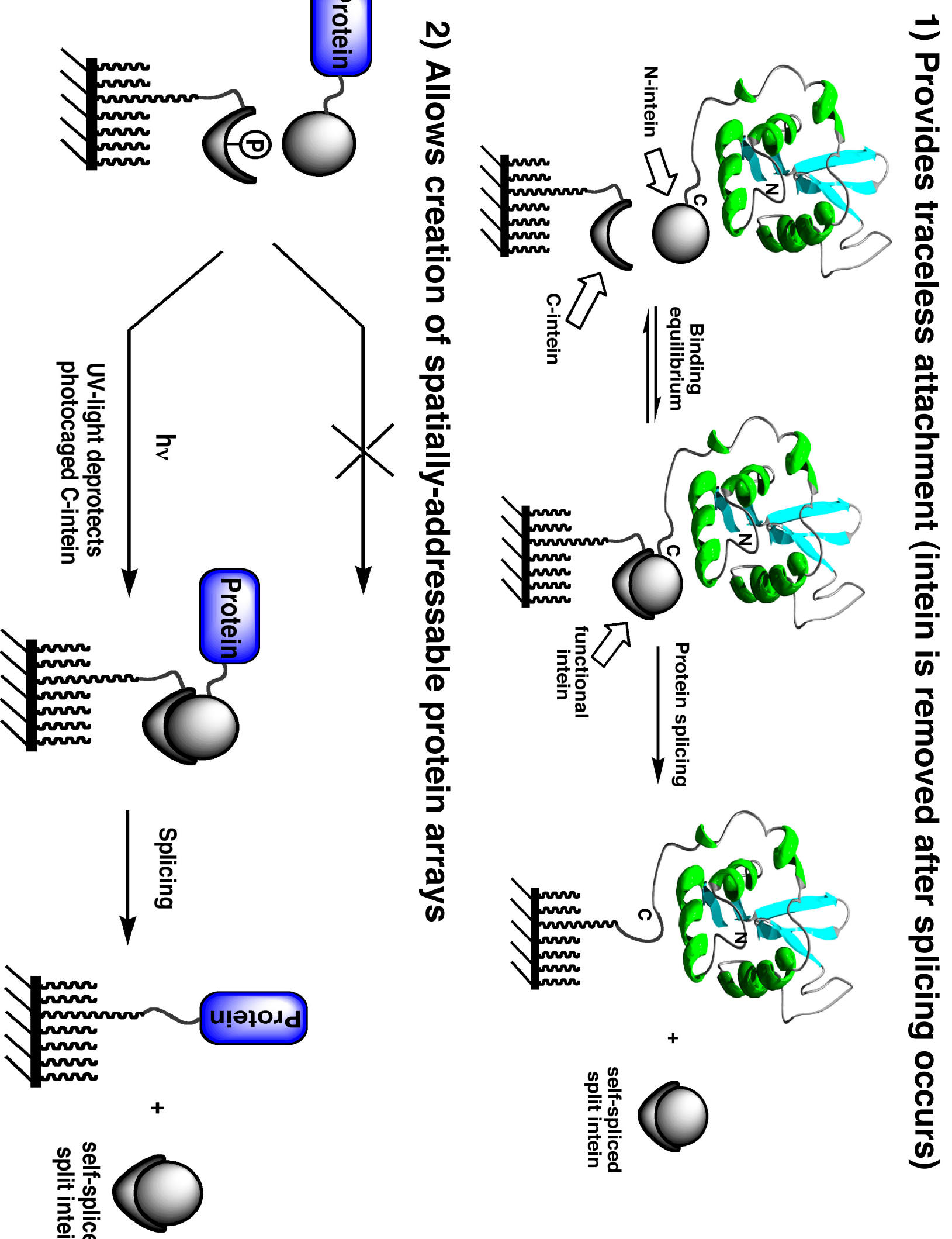


## Future Directions

Development of novel Entropically Activated Ligation (EAL) methods:



Attachment by using a protein trans-splicing technique:



## Summary

- We are pursuing a general approach which combines scanning probe nano-lithography and chemo-selective linkers to fabricate chemical templates for creating ordered protein and virus arrays.
- We have developed chemical routes for the synthesis of modified alkane thiols which can react with Si- and Au-based surfaces. Moreover, these molecules can be used for surface passivation and site-specific binding of engineered proteins/virus.
- This approach has been successfully used for making nano-templates of genetically engineered CPMV viruses in micron and nano-scale patterns.
- Future directions will involve the development of even more generic approaches involving chemoenymatic-like chemistry, allowing the creation of extremely efficient attachment of proteins at extremely low concentration.